**Problem Set: Basic Programming**

This document includes a set of programming problems. Some of the problems were discussed in the lectures (הרצאות), recitations (תירגולים), and the workshops (סדנאות). Some problems are new. Most of the problems are relatively easy, and are given as optional, self-study exercises. There is no need to submit any answers.

Some problems show a program and ask what it does. Try answering these questions without writing and executing the programs. Other problems task you to write programs. You can write these programs on paper, or try to write and execute them – do what you can to flex your muscles and improve your skills.

In terms of time allocation, you should focus first on completing the weekly homework assignments. If you have more time and feel the need, you can also work on this problem set.

1. a. Write a program that takes one command line argument. If the value supplied by the command line is less than or equal to 120, the program prints young. Otherwise, the program prints nothing.

b. Write a program that takes one command line argument. If the value supplied by the command line is less than or equal to 120, the program prints young. Otherwise, the program prints old.

2. For each one of the following programs, write what the program prints. If the program has an infinite loop, say so.

// Program 2a

public static void main(String[] args) {

int num = 5;

if (num > 2) {

System.out.println(num);

num -= 1;

}

System.out.println(num);

}

// Program 2b

public static void main(String[] args) {

int num = 0;

while (num <= 5) {

System.out.println(num);

num += 1;

}

System.out.println("Outside of loop");

System.out.println(num);

}

// Program 2c

public static void main(String[] args) {

int x = 0;

int y = 2;

while (x < 10) {

y \*= 2;

y += x;

x -= 1;

}

System.out.println(y);

}

// Program 2d

public static void main(String[] args) {

int num = 10;

while (num > 3) {

num -= 1;

System.out.println(num);

}

}

// Program 2e

public static void main(String[] args) {

int n = 10;

while (true) {

if (n < 7) {

System.out.println("Breaking out of loop");

break;

}

System.out.println(n);

n -= 1;

}

System.out.println("Outside of loop");

}

// Program 2f

public static void main(String[] args) {

int n = 100;

while (true) {

if (n < 0) {

break;

}

}

System.out.println("n = " + n);

}

2. Write a program that uses a while loop to print the following output (including the ‘end’ at the end):

2

4

6

8

10

end

3. Write a program that uses a while loop to print the following output (including the ‘start’ at the beginning):

start

10

8

6

4

2

4. Write a program that takes one command line argument, n. The program uses a while loop that sums up the values 1 through n, inclusive, and prints this sum. For example, if n = 5, the program prints 15.

5. Write a program that uses a for loop to print the following output (including the ‘end’ at the end):

2

4

6

8

10

end

6. Write a program that uses a for loop to print the following output (including the ‘start’ at the beginning):

start

10

8

6

4

2

7. Write a program that takes one command line argument, n. The program uses a for loop that sums the values 1 through n, inclusive, and prints this sum. For example, if n = 5, the program prints 15.

8. For each one of the following programs, write what the program prints. If the program has an infinite loop, say so.

// Program 8a

public static void main(String[] args) {

for (i = 0; i < 5; i++) {

System.out.println(i);

}

System.out.println(i);

}

// Program 8b

public class Main {

public static void main(String[] args) {

int d = 2;

for (int i = 0; i < 10; i += 2) {

System.out.println((double)i / d);

}

}

}

// Program 8c

public static void main(String[] args) {

for (int x = 0; x < 20; x++) {

if (x % 4 == 0) {

System.out.println(x);

}

if (x % 5 == 0) {

System.out.println("5 divides " + x);

}

}

}

// Program 8d

public static void main(String[] args) {

int count = 0;

String str = "Sababa!";

for (int i = 0; i < str.length(); i++) {

char letter = str.charAt(i);

System.out.println("Letter # " + count + " is " + letter);

count += 1;

if (count == 4) {

break;

}

}

System.out.println(count);

}

9. Write a Java program that takes one command line argument and treats it as a string that represents a word in English. The program prints every letter in the word, and then space. At the end, the program prints a period. For example, if the word is class, the program prints  
c l a s s.

10. Consider the program below, and answer the following questions:

public static void main(String[] args) {

String greeting = "Hello!";

int count = 0;

for (int i = 0; i < greeting.length(); i++) {

count += 1;

if (count % 2 == 0) {

System.out.println(greeting.charAt(i));

}

System.out.println(greeting.charAt(i));

}

System.out.println("done");

}

How many times the program prints 'H'?

How many times the program prints 'e'? Disregard the letters in the word "done"

How many times the program prints 'l'?

How many times the program prints 'o'? Disregard the letters in the word "done"

How many times the program prints '!'?

How many times the program prints 'done'?

11. Consider the program below, and write what the program prints.

public static void main(String[] args) {

String str = "Efi Arazi School of Computer Science";

int nv = 0;

int nc = 0;

for (int i = 0; i < str.length(); i++) {

char c = str.charAt(i);

if (c == 'a' || c == 'e' || c == 'i' || c == 'o' || c == 'u') {

nv += 1;

} else if (c == 'E' || c == 'S') {

System.out.println(c);

} else {

nv += 1;

}

}

System.out.println(nv);

System.out.println(nc);

}

**“Bonus” (more challenging problems):**

12. Write a program that prints the number of times the string 'foo' occurs in a given string. For example, if the string is "hsdhfoosdjsdfoosddd", the program prints 2.

13. Write a program that prints the longest substring of a string s in which the letters occur in alphabetical order. For example, if s = "azcbobobegghakl", the program prints the string "beggh". In the case of ties, print the first substring. For example, if s = "abcbcd", the program prints "abc".